DETAILED ACTION

Status of the Claims

Claims 1-13 and 17-22 are pending in the instant application; claims 3-6, 11-13 and 17-22 are withdrawn as being directed to a non-elected invention; claims 1, 2 and 7-10 are the subject of the Office Action below.

Claim Rejections - 35 USC § 103 - Maintained

The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. § 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

<u>*Claims 1, 2 and 7-10 are obvious over Nielsen, Sun, Ohara and Ashmead*</u>:

The rejection of claims 1, 2 and 7-10, under 35 U.S.C. § 103(a) as being unpatentable over Nielsen *et al.*, Int. Pub. No. WO 02/38354, published on May 16, 2002, in view of Sun *et al.*, WO 02/34381 A1, published on May 2, 2002, Ohara *et al.*, U.S. Patent No. 4,283,308, issued on August 11, 1981, and Ashmead *et al.*, U.S. Patent 3,799,396, issued on March 26, 1974, <u>are maintained</u>.

Applicants are of the opinion that the rejection is improper because Applicants allege that the rejection is based upon hindsight reasoning. In response to Applicants' argument that the Examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based

upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the Applicants' disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

Applicants rebuttal of the rejected claims does not fairly consider the art applied in the rejection, including the difference between what has been taught by the primary reference, and what is remedied by the additional references. In addition to not considering the art as a whole, Applicants also fail to consider a number of factors that are relevant to the obviousness inquiry, such as certain factors useful in determining the level of skill in the art. The following are factors that are useful in determining the level of skill in the art as set forth by the CAFC[1]:

1) the type of problems encountered in the art;
2) prior art solutions to those problems; and
3) sophistication of the technology.

The difference between the claimed invention and the teaching of the primary reference, Nielsen, is and was clearly stated in the previous Office Action. For example, this limitation reads on art that

In the rejection, the Examiner makes it clear that while Nielsen teaches varying a conveying rate (*e.g.*, as shown in Figure 1), that Applicants' claimed limitation of "the conveying rate thereof varies periodically corresponding to a periodic function varying between a lower and an upper limiting value and whose periods are constant over time," is not expressly disclosed. For example, Nielsen does not expressly teach utilizing a repeated sinusoidal function as one of the functions applied in Figure 1, because otherwise, such a teaching would be considered anticipatory. Nielsen, however, only goes as far as to expressly teach the flow function variations in Figure 1, the importance of varied mixtures, the use of polynomial equations to control the amounts of mixtures/variations, and the use of programmable logic controllers with frequency converters to controlling mixing of the continuous library of products.

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[1] *See Environmental Designs, Ltd. v. Union Oil Co.*, 713 F.2d 693, 696, 218 USPQ 865, 868 (Fed. Cir. 1983); *see also Orthopedic Equip. Co. v. United States*, 702 F.2d 1005, 1011, 217 USPQ 193, 198 (Fed. Cir. 1983); *Bausch & Lomb, Inc. v. Barnes-Hind/Hydrocurve, Inc.*, 796 F.2d 443, 449-450, 230 USPQ 416, 420 (Fed. Cir. 1986).

However, the difference between a sinusoidal function and varied functions would be obvious to the person of ordinary skill in the art based upon the art of record, because the art is analogous (*i.e.*, each of Nielsen, Sun, Ohara and Ashmead are directed towards methods of preparing an optimized product mixture wherein the amounts/concentrations of the individual components of the mixture are varied), the prior art solution yields predictable results (*i.e.*, sinusoidal variations are more easily generated wave forms compared to polynomials yet allow a vast range or experimental parameters to be studied), and because the implementation of sinusoidal waveform using, for example, a frequency generator, is a common and routine approach in experimentally achieving varied mixtures.

Accordingly, the rejection is maintained.

Claim 1 is directed to A process for continuous preparation of mixtures from at least two components, comprising the steps of: a) charging at least two individual components to storage vessels; b) introducing each individual component by way of a conveying device for each component into a mixing device, each conveying device having a conveying rate; c) varying the conveying rate of at least one of the conveying devices in such a way that the conveying rate thereof varies periodically corresponding to a periodic function varying between a lower and an upper limiting value and whose periods are constant over time; and mixing the individual components in the mixing device.

As in claim 1, Nielsen teaches a method for production of a polymer product with varying hardness comprising adding together and mixing at least two substances with predetermined relative amounts, filling the substances after mixing into a form, and hardening of the substances to a solid elastic product. According to the invention, the relative amounts of the substances are continuously varied during filling of the form in order to achieve a product with continuously varying hardness within the product (see Figures 1 and 2, and description thereof). Nielsen states:

> "The flowing speed of the different substances to be mixed is calculated by the computer 301. For example, this can be achieved by interpolation between the data as shown in Table 2. From these data, a polynomial equation can be calculated which describes the continues variation of the flow speed for the different substances by regulation of the speed for each of the pump motors 206. Being able to produce elastomer products with

> continuously varying hardness within the product, several known problems may be solved."

Nielsen, page 6, lines 23-30.

The following is also found in Nielsen: as in claim 2, at least one of the rates is varied periodically and one rate continuously rises (see Figure 1). As in claim 7, the conveying rates in proportional to a give compositional resolution (see Figure 1). As in claim 8, the total conveying rates are constant in order to produce continuously varying hard films (page 6, lines 23-30). As in claim 9, each one of the components is a liquid, solid or gas. As in claim 10, Nielsen teaches polymer melts and additives (see Table 1 on pages 3 and 4).

Although Nielsen teaches continually varying the individual mixture components, wherein the variation can be described by a polynomial equation, Nielsen does not explicitly recite the claimed expression of claim 1, "the conveying rate thereof varies periodically corresponding to a periodic function varying between a lower and an upper limiting value and whose periods are constant over time."

Sun teaches a system and method for providing a combinatorially conveyed mixture from a mixing device, where each of the components can be continually varied in order to identified the proper mixture of each component having the desired physical and/or chemical properties. Sun states:

> "Fig. 11, which summarizes the methods described in detail above, is a functional block diagram of a method 106 for making an array of coated materials that form a coating library. The method 106 includes providing a substrate 18 having a surface 16 with a plurality of predefined regions 22 (Block 108). Preferably, the substrate 18 is moving and, more preferably, the substrate 18 is moving at a substantially constant rate. The method 106 further includes providing a plurality of materials 14 for coating the substrate 18 (Block 110). The method 106 also includes providing a ***continuously varying mixture*** 13 of the plurality of materials 14 for coating the substrate 18 (Block 112). ***This may be accomplished using a mixer 26.*** The composition of the continuously varying mixture 13 of the plurality of materials 14 is controlled by a controller 28 (Block 114). Finally, the method 106 includes delivering the ***continuously varying mixture 13 of the plurality of materials 14*** onto the surface 16 of the preferably moving substrate 18 to form a predefined coating 32 on each of the plurality of predefined regions 22 of the substrate 18 (Block 116). The continuously varying mixture 13 of the plurality of materials 14 is

> preferably delivered onto the surface 16 of the substrate 18 in a vaporized/atomized or liquid state and the predefined coating 32 may be a thin film coating. The method 106 may optionally include curing each of the plurality of predefined regions 22 of the coated substrate 18 using a selected one of a plurality of curing environments."

Sun, page 18, line 18 through page 19, line 6 (emphasis added).

Ohara teaches a process for producing an auto exhaust gas catalyst capable of simultaneously removing hydrocarbons, carbon monoxide and nitrogen oxides. The experiments of Ohara are carried out by various procedures for optimization, and include a system component for continuously varying air-fuel mixtures that are introduced to the experimental catalysts. Ohara system is described as follows:

> "In order to simulate a periodic deviation of the A/F ratio from stoichiometry in a "closed loop operation" with an oxygen sensor, a "function generator" is installed in NISSAN-L-18E engine (1.8 l displacement) with an electronic fuel injection system. The A/F perturbation technique used is very similar to the one described in SAE 770371.
>
> An external periodic signal of sinusoidal shape at a frequency of 1.0 Hz from the function generator is introduced into an electronic control unit (ECU). Then, the DC voltage related to an A/F change of +/- 1.0 A/F unit (for example, from 13.5 to 15.5) is empirically determined. The engine is loaded by an electric dynamometer to simulate a typical cruising load."

Ohara, col. 8, lines 10-23.

Ashmead teaches a method of proportioning two liquids comprising periodically controlling the operation of a valving means to control the amount of each liquid supplied to a mixing region during each period of valve operation to produce a supply of a liquid mixture having a precisely controlled time varying concentration of each liquid:

> "One of the greatest advantages of the present system is its versatility. The initial and final concentration of the eluent can be set with ease, and the rate of change of this concentration can also be set wtih ease. FIG. 6 illustrates a programming sequence that can be used to change the concentration in the eluent. This system uses ***two electronic signals***; one signal, signal 60, is ***a periodic saw tooth wave***, the ***other signal, signal 62, is a gating signal***, which in the case illustrated is a linear ramp. The programming means, being an electronic signal generator, generates the two signals simultaneously, and is adapted to activate one valve, when the

> instantaneous value of the saw tooth wave is greater than the instantaneous value of the gating function, and to actuate the other valve when the instantaneous value of the saw tooth wave is less than the instantaneous value of the gating function. If valve 16 is the first valve, the shaded region of the bar below the graph indicates the time interval that liquid A is being supplied to the mixing chamber, and the unshaded regions indicate the time intervals where liquid B is being supplied. ***The relative periods will depend on the types of functions generated. Utilizing the versatility of electronic function generating, almost any programming sequence can be envisioned. The one illustrated is a useful programming sequence. A saw tooth wave 60 combined with any monotonically increasing gating signal of arbitrary function, such as signal 63 is another useful sequence. A linear gating signal 62, combined with any periodic signal of arbitrary function would also be useful.***"

Ashmead, col. 8, lines 7-37 (emphasis added).

Each of Nielsen, Sun, Ohara and Ashmead are directed towards methods of preparing an optimized product mixture wherein the amounts/concentrations of the individual components of the mixture are varied. One of ordinary skill in the art would have had a reasonable expectation of success in utilizing the periodic function as claimed because the use of periodic functions for controllably varying the amounts of various components of a mixture in an effort for optimization and/or understanding the role that the amounts and type of each component have on the mixture is well known and appreciated in these arts as illustrated by Ohara and Ashmead, and would produce predictable results when combined with the component mixing methods of Nielsen and/or Sun. Accordingly, the invention as a whole was *prima facie* obvious at the time it was claimed.

Common Ownership of Claimed Invention Presumed

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the Examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR § 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later

invention was made in order for the Examiner to consider the applicability of 35 U.S.C. § 103(c) and potential 35 U.S.C. §§ 102(e), (f) or (g) prior art under 35 U.S.C. § 103(a).

Conclusions

No claim is allowable.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

If Applicants should amendment the claims, a complete and responsive reply will clearly identify where support can be found in the disclosure for each amendment. Applicants should point to the page and line numbers of the application corresponding to each amendment, and provide any statements that might help to identify support for the claimed invention (*e.g.*, if the amendment is not supported *in ipsis verbis*, clarification on the record may be helpful). Should Applicants present new claims, Applicants should clearly identify where support can be found in the disclosure.

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Jeff Lundgren whose telephone number is 571-272-5541. The Examiner can normally be reached from 7:00 AM to 5:30 PM.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, James (Doug) Schultz, can be reached on 571-272-0763. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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